Theoretical Computer Science 29 (1984) 229–230
North-Holland

CORRIGENDUM

ON INFINITE COMPUTATIONS IN DENOTATIONAL SEMANTICS

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Theoretical Computer Science 26 (1, 2) (September 1983) pp. 53–82

Communicated by M. Nivat
Received May 1982
Revised October 1982
Corrigendum received December 1983

We are indebted to colleagues and students of the University of Utrecht for pointing out to us the following two errors in our paper.

(1) The formalism to determine the finite and infinite parts as it is presented fails to work properly with respect to the abort statement Δ, due to the strictness of the semantic functions regarding the state δ. Technically this problem can be resolved by deleting this strictness and defining the following:

(a) $\delta\{\alpha/x\}=\delta$, i.e., modifications of the δ-state yield δ itself,

(b) $\mathscr{W}(b)(\delta)=f\!f$, which implies that for instance $\mathscr{R}(\textbf{false})(\delta)=\emptyset$ by Definition 2.4(c).

However, we appreciate that one may object that the operational intuition behind this resolution is less clear; one would perhaps expect that a boolean statement (e.g. **false**) to be performed in δ should leave a trace of δ in the resulting set of states.

(2) Lemma 2.3 as it stands is incorrect. In fact, for a chain $\langle\tau_i\rangle_i$ with $\tau_i\in\Theta$ we do not necessarily have that its lub exists (take, e.g., $\tau_i\in\Theta$ such that $\perp\notin\tau_i$ and such that $\bigcup_i\tau_i$ is infinite). What we need as ordering on Θ is the (usual) Egli–Milner ordering $\sqsubseteq_{EM}$ defined by $\tau_1\sqsubseteq_{EM}\tau_2$ iff either $\perp\in\tau_1$ and $\tau_1\backslash\{\perp\}\subseteq\tau_2$ or $\perp\notin\tau_1$ and $\tau_1=\tau_2$. It is well known (see, e.g., [4]) that Θ is a cpo with respect to $\sqsubseteq_{EM}$, and

that the operations $\hat{}$, $\circ$ and $\cup$ are continuous with respect to $\sqsubseteq_{EM}$. However, on $\mathcal{P}(\Sigma)$ we need the more general ordering, say $\sqsubseteq_G$, as given in Definition 2.2(a): $\tau_1 \sqsubseteq_G \tau_2$ iff $\perp \in \tau_1$ and $\tau_1 \backslash \{\perp\} \subseteq \tau_2$, or $\perp \notin \tau_1$ and $\tau_1 \subseteq \tau_2$ and $\perp \notin \tau_2$. This ensures that the following is satisfied:

(a) $\tau_1 \subseteq \tau_2$ implies $\tau_1 \sqsubseteq_G \tau_2$ for sets τ_1, τ_2 that do not contain $\perp$,

(b) $\tau_1 \sqsubseteq_{EM} \tau_2$ implies $\tau_1 \sqsubseteq_G \tau_2$ for all sets $\tau_1, \tau_2 \in \Theta$,

(c) $(\mathcal{P}(\Sigma), \sqsubseteq_G)$ is a cpo, where a chain $\langle \tau_i \rangle_i$ has as lub

$$\bigsqcup\nolimits_G \tau_i = \begin{cases} \bigcup \tau_i & \text{if } \perp \in \tau_i \text{ for all } i, \\ (\bigcup \tau_i) \backslash \{\perp\} & \text{if } \perp \notin \tau_{i_0} \text{ for some } i_0, \end{cases}$$

and

(d) the operations $\hat{}$, $\circ$ and $\cup$ are monotonic with respect to $\sqsubseteq_G$.

We leave it to the reader to perform the corrections in Section 4 induced by the distinction between $\sqsubseteq_{EM}$ and $\sqsubseteq_G$. Note, in particular, that facts (a) and (b) are needed in the proof of Theorem 4.7(e).